EDITORIAL

CHA_2DS_2-VASc: towards a universal risk assessment in cardiovascular diseases?

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The CHA_2DS_2-VASc (congestive heart failure; hypertension; age ≥75 years [double score]; diabetes mellitus; previous stroke/transient ischemic attack [TIA; double score]; vascular disease; age, 65–74 years; sex category, female) score is a validated clinical prediction tool, which is currently used to estimate the risk of stroke in patients with atrial fibrillation (AF). This novel score has been reported to outperform the previous $CHADS_2$ scoring system, which despite its simplicity did not include many common stroke risk factors.[1-3] Therefore, even patients classified as low risk by $CHADS_2$ in its original validation study had a stroke rate of 1.9%/year.[4] In 2010, Lip et al.[5] compared stroke risk stratification schemes in an anticoagulated AF cohort and demonstrated that the CHA_2DS_2-VASc score was characterized by the highest sensitivity. Additionally, the negative predictive value of this score was the highest among other scores with the level of about 99.5%.[5] Given the high mortality and morbidity rates associated with AF-related thromboembolism, a stroke risk score that is more inclusive of common stroke risk factors such as CHA_2DS_2-VASc scheme would have "flagged up" more patients for anticoagulant treatment, which would have the potential to reduce stroke risk in these individuals.[6]

The CHA_2DS_2-VASc score is a simple clinical tool that consists of common cardiovascular risk factors related to thromboembolism; therefore, unsurprisingly, there have been recent reports about its use for prediction of stroke risk or even mortality in various cardiovascular diseases in patients in sinus rhythm.[7,10-13] One of such cohorts are patients with acute coronary syndromes (ACS), as current guidelines recommend early risk stratification to plan appropriate treatment in those patients.[8-10] This can be achieved using an established risk scoring system that predicts mortality, such as GRACE or TIMI scores.[10] Whether the CHA_2DS_2-VASc scale can be that tool is a matter of debate.

It has been demonstrated recently that both $CHADS_2$ and CHA_2DS_2-VASc scores have a strong prognostic value in predicting mainly stroke in patients with ACS, regardless of whether the patient had AF.[11,12] Michell et al.[13] enrolled 20 000 patients with ACS without known AF in the APPROACH prospective registry and showed that both scores predicted ischemic stroke or TIA with similar accuracy to that observed in historical populations with nonvalvular AF, but with lower absolute event rates. Of note, CHA_2DS_2-VASc had a higher discrimination performance than the $CHADS_2$ score.[13] Podolecki et al.[14] showed in patients with acute myocardial infarction that not only the risk of stroke but also of death increased 4-fold in the high-risk group compared with the low-risk group ($P < 0.001$). In that study, every point in the CHA_2DS_2-VASc score was independently associated with an increase of 41% in stroke risk and an increase of 23% in mortality rates ($P < 0.001$ for both).

In the current issue of the *Polish Archives of Internal Medicine*, Kiliszek et al.[15] reports a stud y in which they applied both the CHA_2DS_2-VASc and modified $R_2CHA_2DS_2$-VASc (additional 2 points for renal insufficiency, calculated estimated glomerular filtration rate ≤60 ml/kg/min) scores in patients with ACS. The assessment of renal function had been previously validated in the ROCKET-AF and ATRIA study cohorts and introduced into the R_2CHADS_2 score.[2] Moreover, Barra et al.[12] showed that a similarly modified $R_2CHA_2DS_2$-VASc score has good calibration and high discriminative performance in the prediction of ischemic stroke and all-cause mortality in patients after myocardial infarction.

Kiliszek et al.[15] studied 2557 individuals with ACS who were followed up for a median of about 5 years. The clinical data were pooled from 5 independent cardiac registries with long-term follow-up. About 75% of the patients had ST-segment elevation myocardial infarction (STEMI)

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and most of the study population was treated invasively. The aim of the investigators was to assess the long-term predictive value of CHA_2DS_2-VASc and $R_2CHA_2DS_2$-VASc scores in ACS patients without a history of AF and to compare those scales with the TIMI and GRACE scores.

The investigators showed that both the CHA_2DS_2-VASc and $R_2CHA_2DS_2$-VASc scores were strongly significant predictors of total mortality. After correction for heart rate on admission, systolic blood pressure on admission, previous myocardial infarction and left ventricular ejection fraction, the scores were still significantly predictive of mortality. The Kaplan–Meier curves showed a gradually worsening prognosis as the $R_2CHA_2DS_2$-VASc score increased.

Kiliszek et al.[15] also compared the CHA_2DS_2--VASc and $R_2CHA_2DS_2$-VASc scores to the widely used in myocardial infarction GRACE, TIMI STEMI, and TIMI NSTEMI risk scores in terms of predicting mortality in the analyzed population. They found that the GRACE and TIMI STEMI scores were superior to the CHA_2DS_2-VASc and $R_2CHA_2DS_2$-VASc scores, which was not surprising. However, when the GRACE score was compared with $R_2CHA_2DS_2$-VASc the difference was significant only at 1-year follow-up. Moreover, the TIMI NSTEMI score was not different from the CHA_2DS_2-VASc score and even worse than the $R_2CHA_2DS_2$-VASc score. Of note, the $R_2CHA_2DS_2$--VASc score presented better predictive values than the CHA_2DS_2-VASc score. The most potent factors influencing mortality were age, chronic kidney disease, and previous stroke. An interesting observation of a "protective" effect of female sex in the multivariate analysis clearly requires further studies.

The results of Kiliszek et al.[15] are similar to those reported by previous studies in patients with ACS. The major difference between those studies is the type of the study population. Contrary to previous studies, Kiliszek et al.[15] enrolled most of the patients with STEMI who were treated invasively with primary percutaneous coronary intervention. Therefore, the observations were made in a contemporary population of ACS patients treated according to the current guidelines. Moreover, a major advantage of the analysis was the comparison of CHA_2DS_2-VASc and $R_2CHA_2DS_2$-VASc with the accepted and widely used GRACE and TIMI scores. Last but not least, it was the largest cohort of patients with ACS studied with a long-term follow-up.

In summary, the CHA_2DS_2-VASc and $R_2CHA_2DS_2$-VASc scores can predict mortality risk in patients with ACS who are in sinus rhythm. These scores are much easier to apply compared with the recommended and widely used GRACE or TIMI scores; therefore, they can be calculated directly at the bedside. The GRACE or TIMI risk score is more complicated and requires the user to input various risk factors into a special formula (which can be done online), where the estimated risk is calculated. Although the CHA_2DS_2-VASc and $R_2CHA_2DS_2$-VASc scores are simple to use and easy to remember, they should not be a substitute for a more robust risk stratification tools in the evaluation of ACS patients. However, it is a very interesting concept to use those scores as the simple and quick assessment of cardiovascular risk even in patients in sinus rhythm diagnosed with various cardiovascular diseases.

REFERENCES

1 Lip GY, Nieuwlaat R, Pisters R, et al. Refining clinical risk stratification for predicting stroke and thromboembolism in atrial fibrillation using a novel risk factor-based approach: The EURO Heart Survey on Atrial Fibrillation. Chest. 2010; 137: 263-272.

2 Piccini JP, Stevens SR, Chang Y, et al. Renal dysfunction as a predictor of stroke and systemic embolism in patients with nonvalvular atrial fibrillation: validation of the R(2)CHADS(2) index in the ROCKET AF (Rivaroxaban Once-daily, oral, direct factor Xa inhibition Compared with vitamin K antagonism for prevention of stroke and Embolism Trial in Atrial Fibrillation) and ATRIA (AnTicoagulation and Risk factors In Atrial fibrillation) study cohorts. Circulation. 2013; 127: 224-232.

3 Opolski G, Kosior DA, Kurzelewski M, Breithardt G; Polish RecordAF Investigators. One year follow up of the Polish subset of the RecordAF registry of patients with newly diagnosed atrial fibrillation. Pol Arch Med Wewn. 2013; 123: 238-245.

4 Gage BF, Waterman AD, Shannon W, et al. Validation of clinical classification schemes for predicting stroke: results from the National Registry of Atrial Fibrillation. JAMA. 2001; 285: 2864-2870.

5 Lip GY, Frison L, Halperin JL, Lane DA. Identifying patients at high risk for stroke despite anticoagulation: a comparison of contemporary stroke risk stratification schemes in an anticoagulated atrial fibrillation cohort. Stroke. 2010; 41: 2731-2738.

6 Larsen TB, Lip GY, Skjøth F, et al. Added predictive ability of the CHA_2DS_2VASc risk score for stroke and death in patients with atrial fibrillation. The prospective Danish Diet, Cancer, and Health cohort study. Circ Cardiovasc Qual Outcomes. 2012; 5: 335-342.

7 Wolsk E, Lamberts M, Hansen ML, et al. Thromboembolic risk stratification of patients hospitalized with heart failure in sinus rhythm: a nationwide cohort study. Eur J Heart Fail. 2015; 17: 828-836.

8 Wright RS, Anderson JL, Adams CD, et al. 2011 ACCF/AHA focused update incorporated into the ACC/AHA 2007 Guidelines for the Management of Patients with Unstable Angina/Non-ST-Elevation Myocardial Infarction: a report of the American College of Cardiology Foundation/American Heart Association Task Force on Practice Guidelines developed in collaboration with the American Academy of Family Physicians, Society for Cardiovascular Angiography and Interventions, and the Society of Thoracic Surgeons. J Am Coll Cardiol. 2011; 57: 215-367.

9 National Clinical Guideline Centre for Acute and Chronic Conditions. Unstable angina and NSTEMI: The early management of unstable angina and non-ST-segment-elevation myocardial infarction. London: National Institute for Health and Clinical Excellence (NICE). Clinical Guideline. 2010; 94: 26.

10 Hamm CW, Bassand JP, Agewall S, et al. ESC guidelines for the management of acute coronary syndromes in patients presenting without persistent ST-segment elevation: the Task Force for the management of acute coronary syndromes (ACS) in patients presenting without persistent ST-segment elevation of the European Society of Cardiology (ESC). Eur Heart J. 2011; 3223: 2999-3054.

11 Poci D, Hartford M, Karlsson T, et al. Role of the CHADS2 score in acute coronary syndromes: risk of subsequent death or stroke in patients with and without atrial fibrillation. Chest. 2012; 141: 1431-1440.

12 Barra S, Almeida I, Caetano F, et al. Stroke prediction with an adjusted RCHA2DS2VASc score in a cohort of patients with a Myocardial Infarction. Thromb Res. 2013; 132: 293-299.

13 Mitchell LB, Southern DA, Galbraith D, et al. Prediction of stroke or TIA in patients without atrial fibrillation using CHADS2 and CHA2DS2-VASc scores. Heart. 2014; 100: 1524-1530.

14 Podolecki T, Lenarczyk R, Kowalczyk J, et al. Stroke and death prediction with CHA2DS2-vasc score after myocardial infarction in patients without atrial fibrillation. J Cardiovasc Med (Hagerstown). 2015; 16: 497-502.

15 Kiliszek M, Szpakowicz A, Filipiak KJ, et al. CHA2DS2VASc and R2CHA2DS2VASc scores have predictive value in patients with acute coronary syndromes. Pol Arch Med Wewn. 2015; 125: 545-552.